

A REVIEW OF THE GENUS *PHYLLURUS* (LACERTILIA: GEKKONIDAE)

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ABSTRACT

Two new species of *Phyllurus* (*P. caudiannulatus* and *P. salebrosus*) are described from mid-eastern Queensland and the other two species of this genus, which is confined to eastern Australia, are redescribed. A key to their identification is provided and distribution of the species is discussed.

The genus *Phyllurus* Schinz, 1822, is defined in detail by Kluge (1967, p. 1017) to include four species—*P. platurus* (White, 1790), *P. milii* (Bory de St. Vincent, 1825), *P. cornutus* (Ogilby, 1892), and *P. sphyrrurus* (Ogilby, 1892). Two distinct groups are recognisable within the genus as it is defined by Kluge. The first comprises *P. milii* and *P. sphyrrurus*. These deep-headed species, covered in rounded tubercles, with robust moderately depressed tails, are referred to *Underwoodisaurus* by Wermuth (1965, p. 47). Species of the second group (*P. platurus* and *P. cornutus*) have extremely depressed heads, very broad, depressed, 'leaf-like' tails, and are covered in conical tubercles.

Two new species described here are referred to *Phyllurus* (*sensu stricto*) because both have extremely depressed heads and are covered with conical tubercles. Only one species (*P. salebrosus* sp. nov.) has the characteristic 'leaf-like' tail of *Phyllurus* species. The other (*P. caudiannulatus*), has a tail that is long, slender, and round in cross-section or slightly leaf-shaped. As *P. caudiannulatus* is very similar to *P. platurus* (the only obvious differences are in tail shape and distribution) and as *U. sphyrrurus* and *U. milii* form an easily recognised separate group, Kluge's definition of the genus *Phyllurus* must be modified to exclude *P. sphyrrurus* and *P. milii* (following Wermuth, 1965) and to include *P. caudiannulatus*. This can be done by describing the tail of *Phyllurus* as moderately long, cylindrical or extremely depressed, not prehensile, without modified terminal subcaudal lamellae.

The four species here referred to *Phyllurus* are confined to eastern Australia between mid-eastern New South Wales and northeastern Queensland. Only one species (*P. salebrosus*) is found far from

the coast. Two species (*P. cornutus*, *P. caudiannulatus*) are apparently usually confined to closed forests and the other two species (*P. platurus* and *P. salebrosus*) inhabit drier rocky areas with sparser vegetation cover.

METHODS

All specimens of *Phyllurus* in the reference collections of the Queensland Museum (QM), the Australian Museum (AM), and the National Parks Branch (Department of Forestry) Museum (RG) have been examined. The following body measurements and morphological characters have been used in separating the species.

Snout to vent length (SVL): From tip of snout to anterior margin of vent.

Tail length (T): Taken in two ways (a) in species with 'leaf-like' tails, because almost all tails have been cast posterior to the vent where the leaf begins, as shown in Fig. 1; (b) in *P. caudiannulatus* which has a 'conventional' tail, from posterior margin of cloaca to tip of tail.

Attenuated tip of tail (TT): As shown in Fig. 1.

Head length (HL): Between tip of snout and posterior margin of ear.

Head width (HW): Greatest width of head.

Snout (S): Tip of snout to anterior margin of eye.

Labials: Counted to exclude granular scales towards angle of mouth.

Number of rows of spines across attenuated portion of tail: Counted from first complete row across the tail, usually corresponding with the posterior end of the 'leaf' (see Fig. 1a).

Rows of tubercles on eyelid: Counted to exclude the row forming the 'eyelash' and the orbital row (see Fig. 2).

KEY TO *Phyllurus* SPECIES

- 1 Throat completely covered with calcareous deposits *P. salebrosus*
 Throat almost smooth, calcareous deposits only in skin covering bones of lower jaw *P. cornutus*
 Throat and skin covering bones of lower jaw smooth 2
 2(1) Specimen with original tail 3
 Specimen with regenerated tail or no tail 4
 3(2) Tail with distinct white bands, cylindrical or slightly leaf-shaped . . . *P. caudiannulatus*
 Tail without distinct white bands, leaf-shaped *P. platurus*
 4(2) Specimen from mid-eastern Queensland *P. caudiannulatus*
 Specimen from mid-eastern New South Wales *P. platurus*

***Phyllurus platurus* (White)**

(Figs. 3, 4; Plates 37B, 38C, 39C, 40D)

Lacerta platura White, 1790, p. 246, pl. 32, fig. 2. (Australia—presumed to be near Sydney, N.S.W.; ?holotype BM xxii98a).

Agama discosura Merrem, 1820, p. 51. (Australia; type(s) presumed lost).

[?] *Phyllurus australis* Swainson, 1839, p. 370.

Phyllurus inermis Gray, 1845, p. 176. (Australia; holotype BM xxiii100a).

MATERIAL EXAMINED

QM Blue Mts., J160; Buladelah J9054; AM no data, 5241, A1237, R959, R966, R992, R1550, R1575, R3588, R3601, R3666, R5182, R11587; Bondi, R1124; Kiama, R2306; Balmain, R2531; Hawkesbury, R3143; Woolwich, R3182; Brooklyn, R3392; Sackville, near Windsor, R3582; near Sydney, R3583, R8305; Callan Park, R3585; Greenwich, Lane Cove R., R3793; Darling Point, R4396; North Sydney, R4404, R12209; Gosford, R4814; Bradley's Head, R5181; Sydney, R5520, R8087; Linfield, R6141; Terrace Falls, Hazelbrook, R6728; Freshwater, Manly, R7087, R7189, R8036; Pennant Hills, R7294; Double Bay, Sydney, R7747; Woodford, Blue Mountains R7987; Coalcliffe, R8037; Mittagong, R8125, R8126; Hunters Hill, R8271; Mosman, near Sydney, R8277, R8918; North Sydney, R8595; Lithgow, R8980; Cremorne, R9274; Northbridge, R9826; Epping, R1005, R10377; Lane Cove R., R10066; Annandale, R10068; Watson's Bay, R10220; Croydon Park, R10374; near Gosford, R10384; Harbord, R10387; Sydney, R10412, R21047; Tuggerah Lakes, R10429; Edgecliffe, R10504; Longueville, R11733; Northbridge, R11889; Northmead, R12907; Punchbowl, R13105; Giruan, via Stroud, R15412; Jannali, Sydney, R19084; Jenolan Caves, R20381; Mangrove Creek, via Spencer, R25891, R25912; Saratoga, R26208; Miranda, Sydney, R27324; Faulconbridge, R27325; St. Ives, Sydney, R27330; Castle Hill, Sydney, R27334; Hunters Hill, Sydney, R27940; Baulk-

ham Hills, Sydney, R28308; North Shore, Sydney, -4942, A11701; Double Bay, Sydney, A9615; Wallis Lake, Tuncurry, R8253; Buladelah, R8103. All localities are in New South Wales.

DIAGNOSIS

A small leaf-tailed *Phyllurus* very similar to *P. caudiannulatus* from which it may be distinguished readily by tail shape (depressed, broad, leaf-like original and regenerated tail vs conventional cylindrical original and regenerated tail*). Specimens without tails virtually indistinguishable although *P. caudiannulatus* is usually more spinose, especially on the head, than *P. platurus* and the two species occur in widely separated localities (mid-eastern N.S.W. vs mid-eastern Queensland). Distinguished from *P. cornutus* from southeastern Queensland and northeastern New South Wales, with which it has been confused, by size (SV 95.9 (max) vs 140.0), absence of calcareous deposits on throat (present on skin covering bones of lower jaw in *P. cornutus*) and, less reliably, tubercles at flank (very small vs larger, rounded or flattened and strongly hooked in northern specimens).

DESCRIPTION

White's type description of this species is very brief and, although it is accompanied by an illustration, is hardly adequate for distinguishing the species. J. E. Gray (1845, p. 176) examined two specimens he referred to *P. platurus* from 'New Holland' (= Australia). G. R. Gray (1845, p. 17, fig. 2) referred material from 'Sydney' and 'Macquarie River' to *P. platurus*. His illustration shows typical specimens of *P. platurus* with original and regenerated tails (as *P. inermis*). It seems reasonable to assume that White's type specimen was included in those examined by Gray and, in any case, the specimen on which the type description is based almost certainly came from near Sydney because in 1790 there were no other settlements in New South Wales. The only other species of *Phyllurus* which occurs in Sydney (and this is based on a slightly doubtful record) is *P. salebrosus* sp. nov., a very large species which has the attenuated portion of the tail less than $\frac{1}{3}$ total length of the tail. White's type specimen measured $4\frac{1}{2}$ " (114.3 mm) and his illustration is of a specimen with the attenuated portion of the tail equal to almost half the total length of the tail, a feature typical of *P. platurus*.

Boulenger (1885, pp. 49-50) gives a detailed description of *P. platurus* but this is certainly based on several specimens (p-r, Queensland; s, Pt. Curtis

*See footnote on p. 298.

(Gladstone area, Queensland)) which are not *P. platurus* if present distributions have any significance. The measurements given are of a specimen much larger than any examined in this study and the description may be a composite based on specimens of at least *P. platurus*, *P. salebrosus* and possibly *P. cornutus*, highlighting similarities in some of the external morphological features of these species. Examination of specimens of *P. platurus* makes the following elaboration of Boulenger's description possible. Features common to all *Phyllurus* (e.g. head large, very depressed, distinct from neck . . . covered with small granules, intermixed with conical, spinose tubercles . . .) and which do not serve to distinguish the species have been omitted from this description.

SIZE: *P. platurus* is a small species, similar in size to *P. caudiannulatus*. The largest specimen examined is R6728. Dimensions of this specimen are SVL 95.9, HL 29.3, HW 22.3, (tail regenerated). The largest specimen with an original tail (R8980) has the following dimensions SVL 85.5, T 69.0, TT 36.5, HL 27.3, HW 22.2.

FLANK TUBERCLES: Invariably minute if present, and rounded; absent in some specimens (e.g. R25912, R1550).

ORIGINAL TAILS: Few specimens ($\frac{26}{84}$) have original tails. The length of the attenuated tip is close to half the total length of the tail (0.40–0.56). There are 6–9 rows of spines across the attenuated tip of the tail, the posterior half of which is smooth. In most specimens the whole 'leaf' is dotted with conical tubercles but in some the central thickened portion of the tail is smooth. The tubercles at the edges of the tail are long and slender or short, almost conical. The anterior portion of the 'leaf' may be strongly heart-shaped or have almost parallel sides.

REGENERATED TAILS: Smooth both ventrally and dorsally; fringe broad or narrow and usually terminating in a well defined tip which may be very short or long and tapering.

ROWS OF TUBERCLES ON EYELIDS: Usually one row, but may be none or two or the tubercles may be irregularly arranged. All are very small.

COLOUR: Live specimens of *P. platurus* have not been examined for this study. Green (1973, p. 21) notes that this species is 'usually light brown or grey, similar to the sandstone in which it lives'. Preserved specimens are light brown or grey and most bear darker brownish flecks or striations all over the dorsal surface. Ventrally specimens are pale cream to grey.

HABITAT

Green (1973) has discussed the habitat of this species in detail. *P. platurus* is almost invariably confined to sandstone areas.

DISTRIBUTION

P. platurus occurs only in mid-eastern New South Wales and is confined to the 'Sydney-Hawkesbury Sandstone' as it is defined by Bredeen (1972, p. 6). Queensland records of this species (e.g. Museum of Comparative Zoology, Harvard specimen 10259, Mt Tamborine, S.E.Q. of Loveridge 1935, p. 298 and the small specimen of Lönnerberg and Anderson (1915, p. 3), also from Tamborine) are almost certainly based on specimens of the southern form of *P. cornutus*.

Phyllurus cornutus (Ogilby)

(Figs. 1, 3, 4; Plates 36A, 37D, 38D, 39D, 40C)

Gymnodactylus cornutus Ogilby, 1892, p. 8. (Bellenden Ker Ranges, northeastern Queensland; syntypes AM R748–50, R752–3, R1094).

Phyllurus lichenosus Gunther, 1897, p. 405, pl. 12. (Mount Bartle Frere, northeastern Queensland, holotype presumed lost).

Gymnodactylus sphyurus Barrett, 1950, p. 31. (non *G. sphyurus* Ogilby).

MATERIAL EXAMINED

SYNTYPES: Bellenden Ker, NE.Q., AM R748–50, R752–3, R1094.

OTHER SPECIMENS: QM (NE.Q.): Shipton's Flat, via Cooktown, J17801; 14.4 km SW. Mossman, J7936; Atherton, J5704; Walsh Camp, via Atherton, J9532; Millaa Millaa, J5508; Bellenden Ker, J3021; Innisfail, J5323; Ingham, J3429; AM (NE.Q.): Millaa Millaa R11375; Bartle Frere, R4769; Evelyn, approx. 14.4 km from Ravenshoe, R26117–23. QM (SE.Q., NE.NSW.): Tamborine J8183, J12257; Mt. Tamborine (= Tamborine Mt.) J398, J2409, J2933–4, J3254, J4439, J8359, J8861, J10440; Eagle Heights, (?) J4819; Mt. Cluny J8074–5, J8099; Binna Burra J8646; Mudgeeraba J4198, J5690; Canungra J148, J3215; Mt. Ballow J23937; Beechmont J5649; Tallebudgera J3313, Mt. Lindsey J10565; Lamington J5382; Tweed R. J1143; N.S.W. J730. AM (N.S.W.) Murwillumbah R2409, A233; Bulga Tableland R6247, R11860; Huonbrook R2315; Nambucca R. R6792; Nimbin R11553; Wauchope, R11621. Queensland. R11844. Girraween, near Stanthorpe RG10.

DIAGNOSIS

A large leaf-tailed *Phyllurus*, distinguished from *P. salebrosus* in having calcareous deposits only in the skin covering the bones of the lower jaw (vs calcareous deposits all over throat) and by length of attenuated tip of tail (greater than one third total length of tail vs less than one third total length of tail). *P. cornutus* is distinguished from the small species *P. platurus* with which it has been confused

in some areas by tubercles at flank (long hooked spines surrounded by smaller spines (*P. cornutus* NE.Q. specimens) or shorter, unhooked, but slender spines usually surrounded by smaller spines (*P. cornutus* SE.Q.–NE.N.S.W. specimens) vs very small, rounded tubercles without smaller tubercles (*P. platurus*). Specimens with original tails are further distinguished by the presence of spines for the full length of the tail tip (absent towards the tip in most specimens of *P. platurus* examined).

DESCRIPTION

SIZE: *P. cornutus* is a large species being smaller than only *P. salebrosus*. The largest specimen examined, a northern specimen (J5704), has the



FIG. 1: *Phyllurus cornutus*. A–B, tail length; B–C, length of attenuated tip of tail.

following dimensions SVL 140.0, HW 30.9, HL 40.5, tail missing. The dimensions of the largest specimen with an original tail (R12935, also a northern specimen) are SVL 140.0, T 89.4, TT 38.4, HW 30.1, HL 41.6. Specimens from southeastern Queensland and northeastern N.S.W. are apparently slightly smaller (dimensions of largest specimen, R11860, SVL 128.0, HW 26.0, HL 35.6, tail regenerated). Only two specimens of the Girraween, near Stanthorpe, SE.Q., population have been examined (RG10; QM live specimen: SVL 96.9–100.2, T (QM live specimen) 70.0, TT 30.0, HW 22.5–23.4, HL 27.8–28.0).

FLANK TUBERCLES: All northern specimens have long, slender, hooked, closely adjacent spines surrounded by smaller hooked spines. In southern specimens the flank tubercles range from long, hooked spines surrounded by smaller hooked spines (J2126) through weakly developed spines (RG10) to small rounded or flattened, widely spaced spines which occur in about half the specimens examined. The absence of long hooked spines in southern specimens has apparently led to some of the confusion of *P. cornutus* with *P. platurus* which has weakly developed flank tubercles.

ORIGINAL TAILS: Length of attenuated tip of tail/total length of tail is shown in Fig. 1. The length of the tip of the tail is approximately half its total length. There are normally 12 (9–14) complete rows of spines across the tail and the spines occur along the total length of the tail tip.

REGENERATED TAILS: Very broad (J3021), or relatively narrow (J5690, J2409) depending on the width of the fringe. The tail is smooth, parallel sided, and usually terminates in a well defined tip.

ROWS OF TUBERCLES ON EYELID: usually 2 rows, rarely 1 or 3.

COLOUR: Very few live specimens have been examined but both greenish and greyish specimens with the typical 'lichen' pattern have been seen. Spirit specimens vary from plain dark brown to very light grey, and are patterned with fine brown lines.

HABITAT

P. cornutus is an inhabitant of closed forests, areas formerly covered in closed forest, and adjoining wet sclerophyll forests. It is believed to be a tree-dweller as specimens are frequently found where trees are being felled. *P. cornutus* is very common in some areas of northeastern Queensland (China Camp, approximately 80 km S. of Cooktown) (J. James, pers. comm.) and southeastern

Queensland (Lamington National Park), specimens being found sitting on trees at night, apparently feeding on insects. The Stanthorpe population is common in granite boulder country, an area with rather sparse, open vegetation cover. In the Girraween National Park 30 specimens were observed in 2½ days. The bulk of these were seen under exfoliations on the boulder sites and the remainder in deep cracks in the boulders. A single young specimen was found under an isolated rock on a large flat boulder. Usually the specimens were solitary but up to three adults were found in several 'suitable' crevices (T. Low, pers. comm.).

DISTRIBUTION

P. cornutus occurs in northeastern Queensland, southeastern Queensland, and north- and mid-eastern New South Wales. No *P. cornutus* have been collected or reported between Ingham and Tamborine although it is likely that the species will be found here with more intensive collecting, especially in the closed forests of the ranges of Mackay, mid-eastern Queensland. With only three exceptions (Mudgeeraba, SE.Q; Ingham, NE.Q.; Innisfail, NE.Q.) the localities from which Queensland *P. cornutus* have been collected are above 300 metres, so it appears that this species has a preference for elevated, cool areas.

DISCUSSION

Three forms of *P. cornutus* are recognisable in the specimens examined—from northeastern Queensland, southeastern Queensland—northeastern New South Wales, and from the Stanthorpe area—but, until more specimens are available especially from mid-eastern Queensland, despite differences in size, flank tubercles and habitat preference, it seems preferable to regard them as a single, rather variable species rather than three distinct taxa.

The detailed description of this species by Ogilby (1892, pp. 8–10) is adequate to enable easy recognition of northern specimens upon which it was based but, although he noted this species to be 'very distinct from *G. platurus*, its nearest ally' Ogilby did not elaborate on his reasons for this. He regarded one unspecified specimen, apparently collected at the same time and place as the syntypes of *P. cornutus*, as being specifically inseparable from *P. platurus*. All northern *P. cornutus* in the collection of the Australian Museum have all the features regarded as diagnostic of the species.

In his description of *P. lichenosus* from Bartle Frere (the mountain adjoining Bellenden Ker, the type locality of *P. cornutus*) Gunther separated *P. lichenosus* from *P. cornutus* because it lacked the

'strong spinate knob surmounted by a conical tubercle behind the eye' and from *P. platurus* largely because it had the 'series of slender tubercles which flanks the abdomen' and which are not present in *P. platurus*. The conical tubercles on the knob behind the eye of *P. cornutus* and the other species of *Phyllurus* occur in a variety of sizes and the size and pattern of tubercles on *Phyllurus* specimens vary greatly. Gunther's illustration shows a definite cluster of spines, if not a knob, behind the eye. This feature is not diagnostic of the species. The original tail of the specimen illustrated has the attenuated tip greater than ⅓ total length of tail—a feature diagnostic of *P. cornutus*. No specimens of *P. cornutus* from mid-eastern Queensland are known and the unnumbered specimen from Port Curtis, mid-eastern Queensland, referred to *P. cornutus* by Gunther is probably *P. salebrosus* sp. nov. the only large *Phyllurus* which occurs in the area. Garman (1901, p. 2) briefly described *P. cornutus*, again from northern material, and noted for the first time the difference in the lateral spines of this species and *P. platurus*.

Only two other reptiles have a recorded distribution similar to that of *P. cornutus*. These are *Tropidechis carinatus* Krefft 1863 (Trinca, Graydon, Covacevich and Limpus, 1971, pp. 803–4) and *Leiopisma challengerii* (Queensland Museum reference collection). Two frogs have similar distributions—*Lechriodus fletcheri* (Boulenger) 1890, *Litoria chloris* (Boulenger) 1893 (Queensland Museum reference collection). Several genera of reptiles with different northern and southern closed forest species have been noted—*Goniocephalus*, *Cacophis* (Queensland Museum reference collection) and *Mixophyes* (Liem and Hosmer, 1973, p. 455). Specimens of species of these genera from the intervening closed forests of mid-eastern Queensland are not known.

Phyllurus caudiannulatus sp. nov.

(Figs. 2, 3, 4; Plates 36B, 37C, 38A, 39A, 40A)

MATERIAL EXAMINED

HOLOTYPE: Queensland Museum J15619, ♂ (with original tail), Bulburin State Forest, via Many Peaks, ME.Q. Coll. 3rd Sept., 1968, J. Covacevich, T. P. Tebble.

PARATYPES: J22286, ♀ (with original tail) and J22287, ♀ (with regenerated tail), both from Granite Creek, Bulburin State Forest, via Many Peaks, ME.Q. Coll. 1st April, 1972, G.B. and S.R. Monteith; J24132, ♂ (with regenerated tail), Forest Station, 700 m, Bulburin State Forest, via Many Peaks, ME.Q. Coll. S.R. Monteith, 29th April, 1974; J25411, ♂ (with original tail), Eungella National Park, via Mackay, ME.Q. Coll. Feb, 1975, K. McDonald.

DIAGNOSIS*

A small *Phyllurus* which differs from other *Phyllurus* in having distinct white bands on the original tail, which may be cylindrical or slightly leaf-shaped. Regenerated tails are cylindrical (*vs* leaf-shape in all other species of *Phyllurus*). Specimens without tails are very similar in size and shape to *P. platurus*. They differ only in being slightly more spinose and in being restricted to closed forest of mid-eastern Queensland (*vs* more open forest in rocky, especially sandstone areas of mid-eastern New South Wales).

DESCRIPTION OF HOLOTYPE

SVL 74.2, TL 138.4, T 64.2, HL 22.0, HW 17.5. Head large, depressed, elongate, triangular, very distinct from neck; skin of the head more or less confluent with cranial ossification; ear opening elliptical, less than half as large as eye. Body moderate. Limbs long; digits strong; subcylindrical at base, compressed distally. Head covered in small granules, intermixed with larger rounded to conical tubercles; a distinct row of small conical tubercles across the head midway between ear and eye, one distinct row of tubercles on eyelid which also bears another row of smaller, irregularly placed tubercles; labials $\frac{14}{14}$. Body and limbs covered dorsally and ventrally with small granules; dorsally these are intermixed with larger conical tubercles which are largest laterally on the body and quite small along the dorsal mid-line and on limbs close to digits. Tail not depressed, slender, tapering, covered dorsally and ventrally by fine granules intermixed dorsally with large, conical tubercles; tubercles in regular rows, smaller towards tip. In spirit, basically fawn (between Tilleul-Buff and Pale-Olive Buff of Ridgway, 1912) dorsally and cream (close to Ivory Yellow of Ridgway) ventrally darker, brownish (Close Brown of Ridgway) blotches irregularly over head, back and limbs. Tail bears six distinct creamish (Cartridge Buff of Ridgway) bands.

VARIATION IN PARATYPES

Variation is very slight. The flank tubercles in the four specimens of *P. caudianulatus* are similar. The first row is very small, rounded at the base and

TABLE 1: DIMENSIONS OF PARATYPES OF *P. caudianulatus*

Specimen	SVL	TL	T	HL	HW
J22286*	75.8	139.0	53.2	21.5	17.6
J22287†	76.5	122.6	46.1	21.5	17.1
J24132†	81.8	133.8	52.0	23.7	18.9
J25411*	84.8	145.0	60.0	23.4	18.0

*original tail †regenerated tail

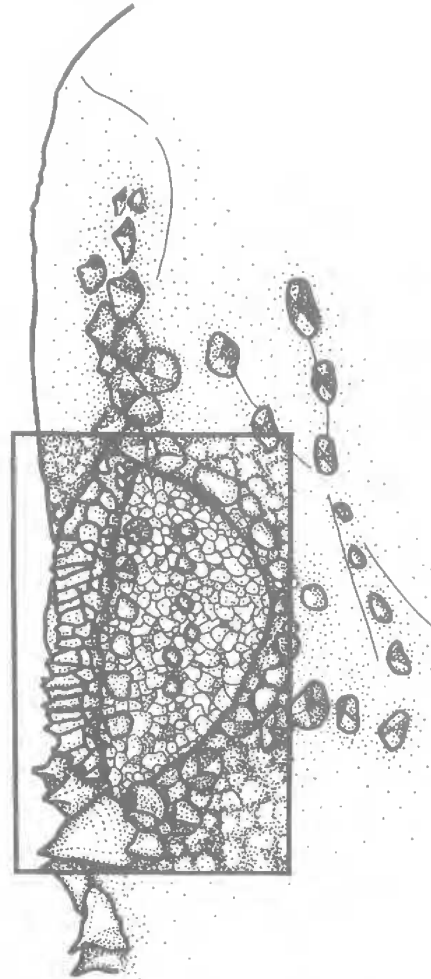


FIG. 2: *Phyllurus caudianulatus* (J15619), showing two rows of tubercles on the eyelid.

*Since this paper went to press a large series of *Phyllurus* has been collected in the Eungella area by the Australian and Queensland Museums supported financially by the Australian Biological Resources Survey.

Although these specimens have slightly flared to distinctly leaf-shaped original and regenerated tails unlike *P. caudianulatus* previously described, they resemble *P. caudianulatus* in size, body proportions, colour pattern (including the presence of light bands on the tail), and spination. Like *P. caudianulatus* previously described, specimens from Eungella without tails are difficult to distinguish from *P. platurus* although light tail bands are not present in any *P. platurus* examined and *P. caudianulatus* and the Eungella specimens are generally more spinose than *P. platurus*.

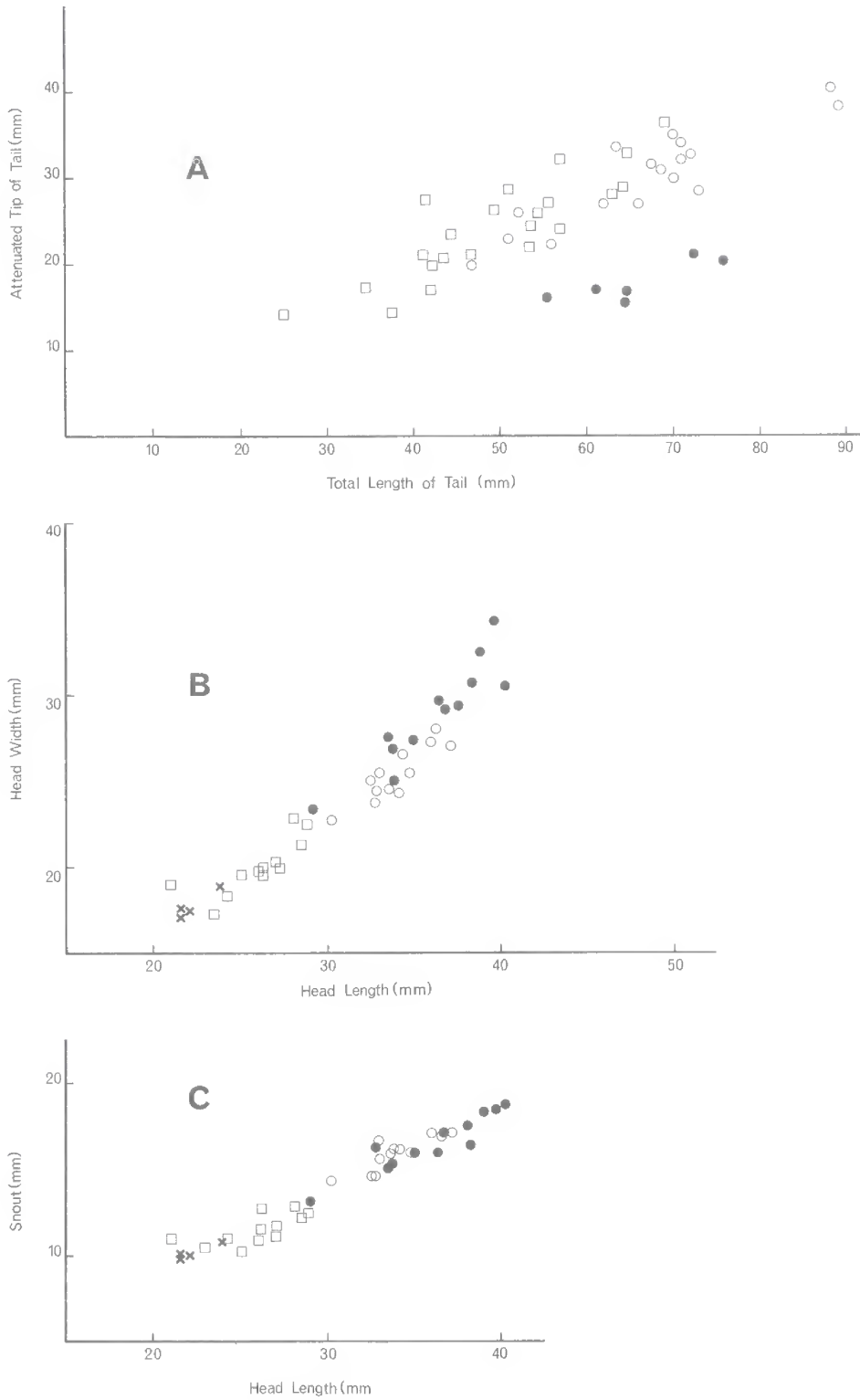


FIG. 3: Head and tail measurements in *Phyllurus* spp.
 ● *P. salebrosus*; ○ *P. cornutus*; □ *P. platurus*; X *P. caudiammulatus*

sharp. Dorsally they are larger and very spinose. Tubercles on the eyelids of all specimens are very small and are irregularly placed. On J22286 the dark blotches of the dorsum form distinct striations on the head, giving an impression of a slightly darker specimen. The tail bands on this specimen were white in life. The regenerated tails of J22287 and J24132 taper conventionally and are covered in small granules which form uniformly small tubercles dorsally and which are smooth ventrally. The regenerated tails lack the distinct light bands of the original tails of J15619 and J22286 but are marked with fine dark lines forming an irregular pattern. The original tail of J25411 is slightly expanded to form a 'leaf' and bears three white bands and one white blotch instead of the 5-6 distinct light bands of the tails of J15619 and J22286.

HABITAT, DISTRIBUTION

P. caudiannulatus is known only from closed forest in two localities in mid-eastern Queensland—Bulburin State Forest, via Many Peaks and Eungella National Park, via Mackay. The holotype (J15619) was collected during the day under the bark of a lichen-covered dead tree stump. Two of the paratypes (J22286-7) were collected at night on a dead tree. The third paratype (J24132) was found at night on the buttress of a live tree. J25411 is one of six specimens seen at night by spotlight approximately 12m above the ground on trees in the Broken River area of the Eungella National Park. *P. caudiannulatus* and *P. salebrosus* are sympatric in the Bulburin State Forest but apparently occupy different niches here. One specimen of *P. salebrosus* (J22288) collected at the same time and in the same place as two paratypes of *P. caudiannulatus* (J22286-7) was found on granite rocks close to the ground.

Phyllurus salebrosus sp. nov.

(Figs. 3, 4; Plates 36C, 37A, 38B, 39B, 40B)

MATERIAL EXAMINED

HOLOTYPE: Queensland Museum J8142, ♂ (with original tail), Monto, SE.Q.

PARATYPES: J2879, ♀ (with original tail), Roma, SC.Q.; J4474 ♀ (with original tail), Coongoola, SC.Q.; J4897, ♀ (with original tail) Coomoooolaroo, via Duinga, ME.Q.; J9770, ♂ (with original tail) Lowmead, ME.Q.; J5390, ♂, J6198, ♀ (with regenerated tails), Goodnight Scrub, Wallaville, SE.Q.; J8377, ♂ (with regenerated tails); Injune, SE.Q.; J22288, ♀ (with regenerated tail), Bulburin State Forest, via Many Peaks, ME.Q.; J6328, ♀ (tail missing), roof of cave, Cracow Creek, Cracow, ME.Q.

OTHER MATERIAL: AM Pt Lincoln [?], R5586; Sydney [?], R300. QM Goodnight Scrub, Wallaville J25360.

DIAGNOSIS

A large (the largest) *Phyllurus*, *P. salebrosus* is distinguished from all other species of *Phyllurus* by its extremely rough throat. Tubercles are present all over the chin, not only on the scales below the jaw bones as in *P. cornutus*, the species it resembles most. The original tail of *P. salebrosus* further distinguishes it from *P. cornutus* (attenuated tip of tail $> \frac{1}{3}$ total length of tail vs $< \frac{1}{3}$ total length of tail).

DESCRIPTION OF HOLOTYPE

SVL 139.1, TL 242.7, T 75.7, TT 20.1, HL 40.4, HW 30.6. Head large, depressed, triangular, very distinct from neck; skin of head almost confluent with cranium; ear opening elliptical, vertical, less than half as large as the eye. Body moderate. Limbs long; digits strong; subcylindrical at base, compressed distally. Head covered with small granules, intermixed with larger, rounded to conical tubercles; one and a half rows of tubercles on eyelid; labials $\frac{14}{13}$; body and limbs covered with small granules, intermixed with conical, almost spinose larger tubercles which are surrounded by smaller conical tubercles towards the sides. Chin, throat and ventral surfaces covered with flat granules intermixed with larger, but still small tubercles. Tail depressed, very broad, leaf-like, contracted at the base, attenuated at the tip; fringed with larger, hooked tubercles; very large conical tubercles in a cluster near contracted base of tail, irregularly towards fringes of leaf, and in eight regular rows over posterior one third of tail; ventral surface of tail smooth. In spirit, basically gray (between Pearl Gray and Light Gull Gray of Ridgway) dorsally and cream (close to Ivory Yellow of Ridgway) ventrally. Dorsally there is a series of brown (close to Burnt Umber of Ridgway) lines forming roughly shaped hexagons. The ventral surface is flecked with a lighter brown (close to Road's Brown of Ridgway) which forms a series of irregular transverse lines on the chin.

TABLE 2: DIMENSIONS OF PARATYPES OF *P. salebrosus*

Specimen	SVL	TL	T	TT	HL	HW
J2879*	119.0	183.8	64.5	16.6	34.5	27.4
J4474*	120.4	196.7	64.4	15.2	33.8	26.7
J4897*	93.5	167.2	55.3	16.0	29.1	23.4
J9770*	115.0	198.4	61.2	17.0	32.8	24.1
J5390†	133.0	187.2	47.8	—	36.7	29.1
J6198†	133.2	173.3	39.6	—	38.0	29.2
J8377†	125.4	194.0	47.6	—	35.0	27.4
J22288†	141.0	197.3	53.2	—	38.8	32.0
J6382 ‡	128.5	—	—	—	39.0	34.5

* original tail † regenerated tail ‡ tail missing

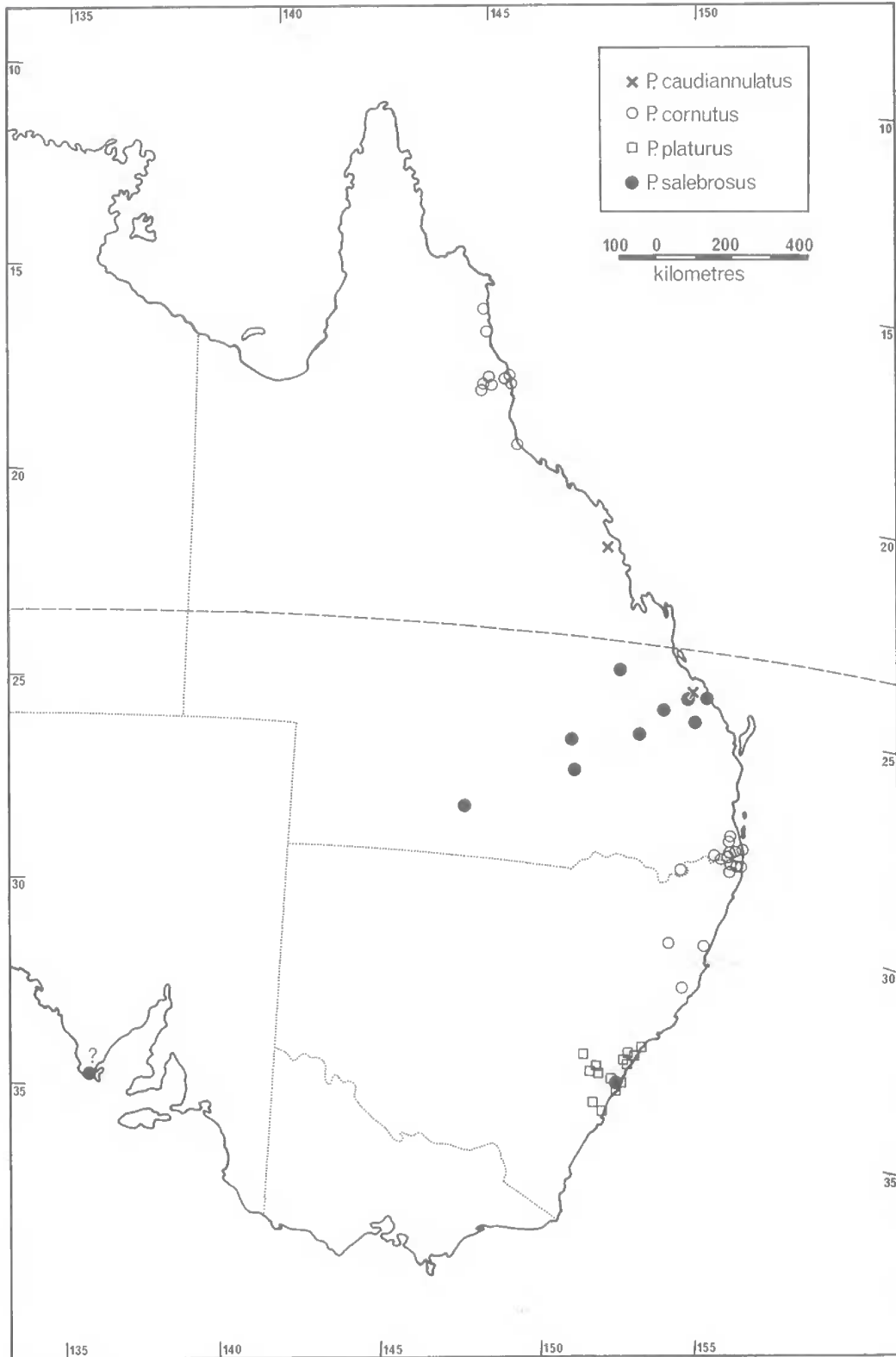


FIG. 4: Distribution of *Phyllurus* spp.

VARIATION OF PARATYPES

Variation is slight. Flank tubercles may be quite long, rounded at the base and surrounded by smaller tubercles (J4474, J6198) or smaller, narrow, and without smaller tubercles (J8377). The calcareous deposits in the throat may be large and well developed (J22288) or smaller and less obvious (J8377). There are two rows of tubercles on the eyelid in five specimens, one is present in two specimens (J22288, J9770), and in J4897 and J6198 there are one and a half rows. Rows of spines across tail in specimens with normal tails vary between 6 (J2879, J4897) and 9 (R5586). Four of the paratypes have regenerated tails, two of which are illustrated. These differ from the regenerated tails of *P. cornutus* in lacking the tip which is usually present in this species and gives the regenerated tail a true 'leaf' shape.

DISTRIBUTION

All *P. salebrosus* examined are from mid-eastern and south-central Queensland, with the exception of two specimens, R5586 (a completely faded specimen with original tail from Pt. Lincoln, S.A.) and R300 (a tailless specimen from Sydney). Although these could be reliable records of a species which is apparently uncommon wherever it occurs, these localities are 1200 and 900 km respectively from the nearest Queensland locality in which *P. salebrosus* is known, and there are no other records of this species outside Queensland.

Detailed collection data is available for only a few specimens of *P. salebrosus*. J6328 was collected from the roof of a cave adjoining Cracow Creek, Cracow, mid-eastern Queensland and J22288 was found at night on granite rocks in closed forest of the Bulburin State Forest, via Many Peaks, mid-eastern Queensland. With the exception of the Bulburin State Forest the localities from which this species has been collected are generally quite dry and rocky. Most are sandstone or granite areas. J22288 was collected at the same time and in the same place as two of the paratypes of *P. caudimaculatus* in the Bulburin State Forest, a moist area bounded on either side by drier granite ridges in which *P. salebrosus* has been collected (J8142, Monto and J9770, Lowmead). Three specimens (J5390, J6198, J25360) have been collected in the Good Night Scrub, near Wallaville, southeastern Queensland. The last, one of two specimens seen by spotlight in similar situations, was found eight metres above the ground on a Bottle Tree (*Brachychiton rupestris*). The Good Night Scrub where these specimens were found is an Araucarian Vine Thicket (Webb 1968, p. 308) on 'stony, light to medium clay with many quartzite fragments'

(Cannon *et. al.* 1962 p. 121). The only other specimen collected recently (held live in the collection of Mr T. Low) was found in Robinson Gorge, via Taroom, southeastern Queensland on the wall of a small open sandstone cave. The species is either uncommon or difficult to find in both areas.

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PLATE 36

Queensland species of *Phyllurus*.

- A. *Phyllurus cornutus* Girraween (released)
- B. *P. caudiannulatus* Bulburin State Forest (J22286)
- C. *P. salebrosus* Robinson Gorge (released)

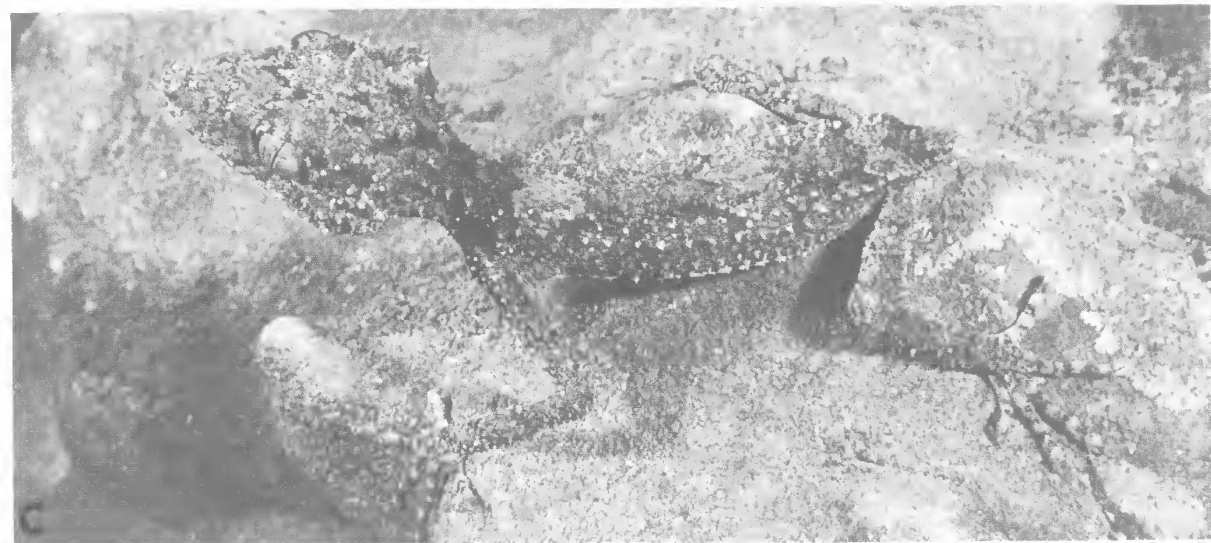
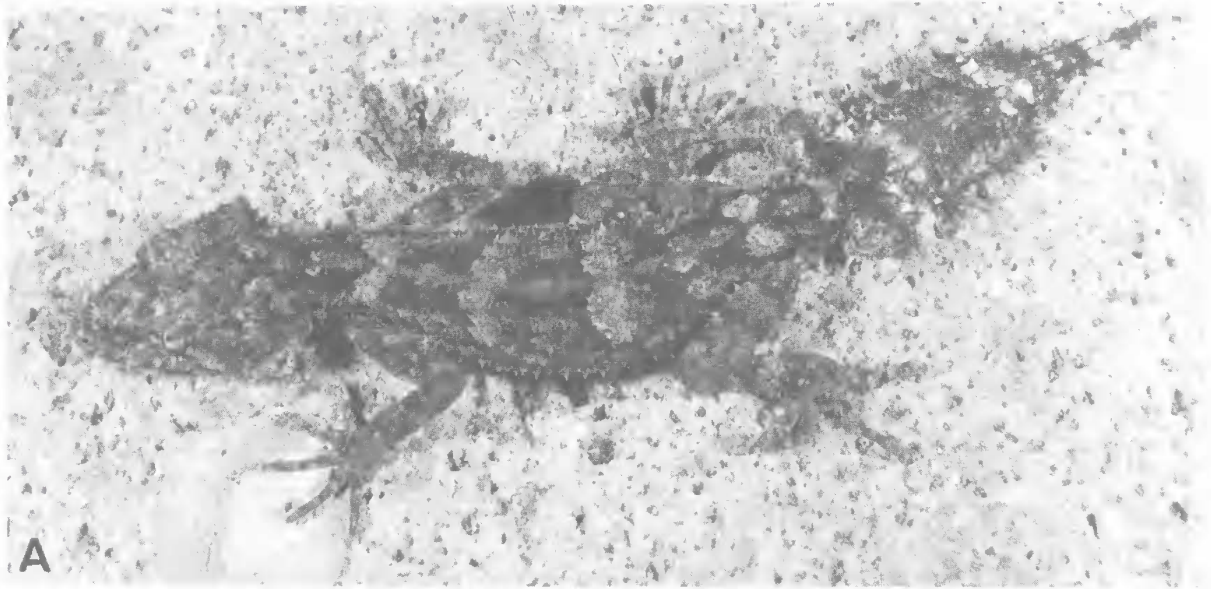


PLATE 37

Variation in flank tubercles of *Phyllurus* spp.

A. *Phyllurus salebrosus* J22288, J8377, J2879

B. *P. platurus* R10220, R10387

C. *P. caudiannulatus* J22287

D. *P. cornutus* R26119, R12935, R2126, R4769, R26118, J2934,
J5690, A233

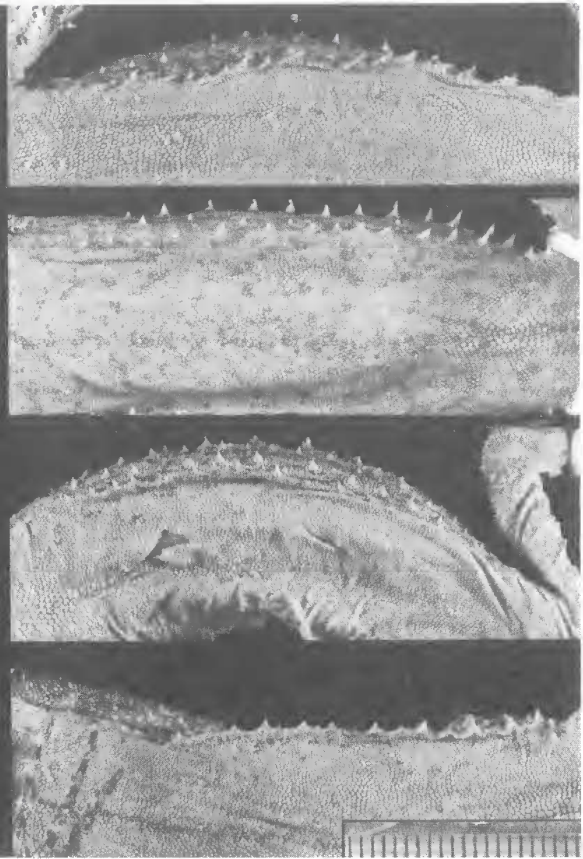
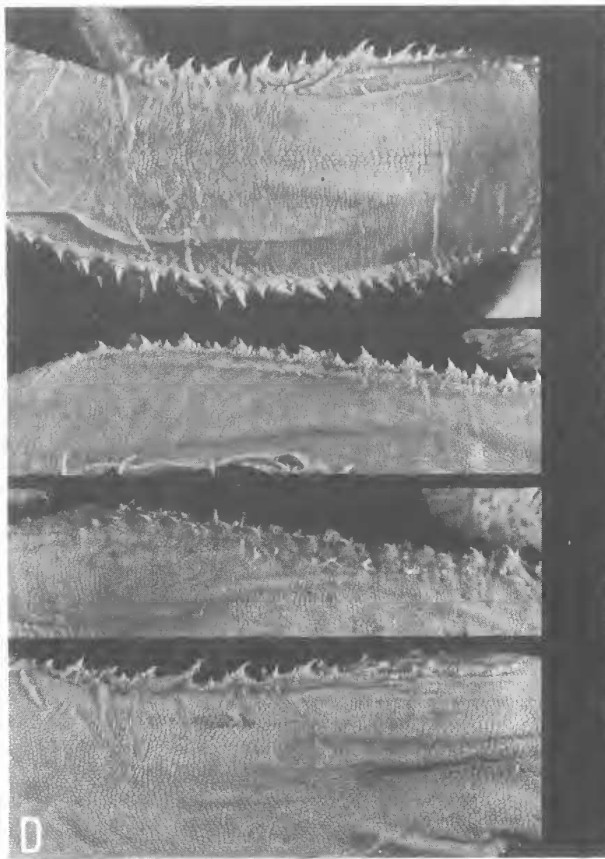
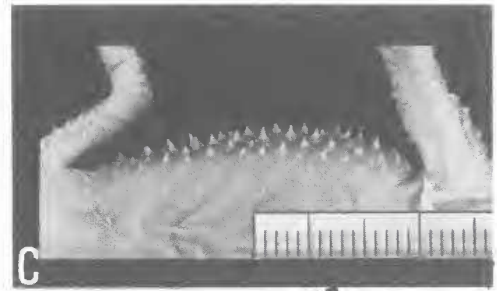
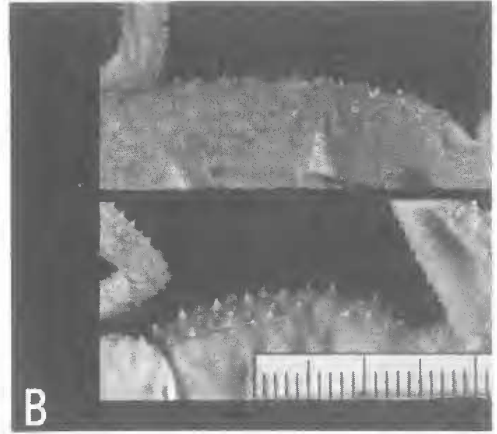
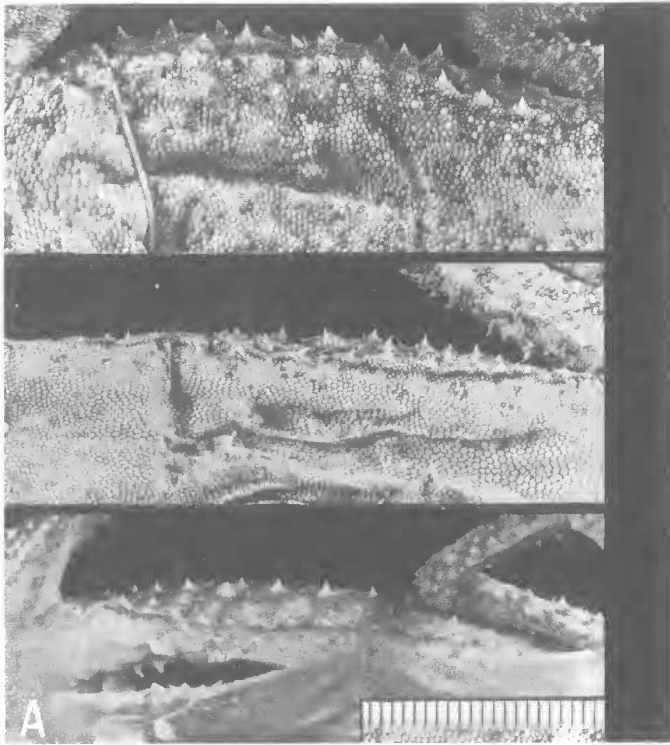


PLATE 38

Variation in original tails of *Phyllurus* spp.

- A. *Phyllurus caudiannulatus* J22286, J25411
- B. *P. salebrosus* J4474, J8142
- C. *P. platurus* R10387, R9274, R27324, R19084, R3793
- D. *P. cornutus* J8075, J8099, R12935, J8359

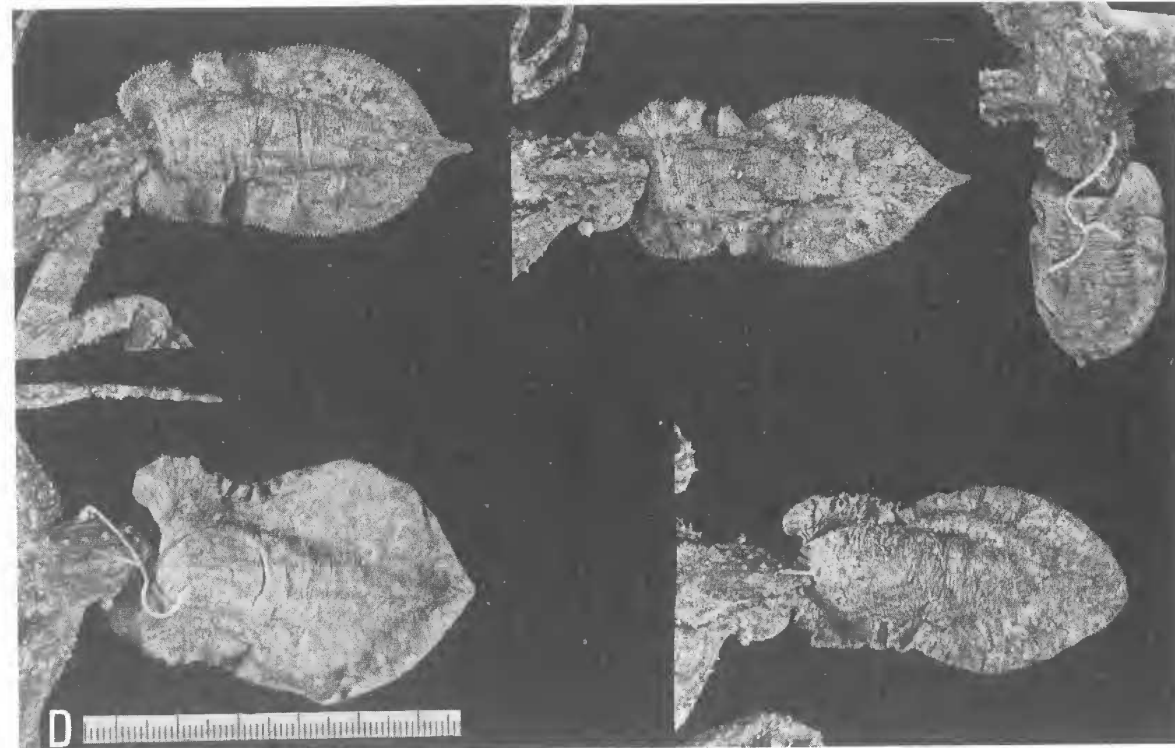
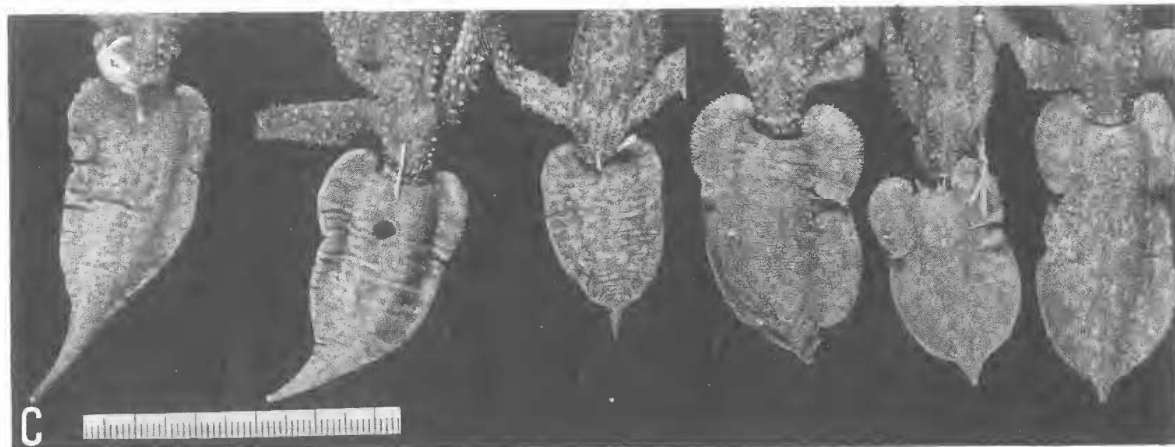


PLATE 39

Variation in regenerated tails of *Phyllurus* spp.

A. *Phyllurus caudiannulatus* J22287

B. *P. salebrosus* J22288, J8377

C. *P. platurus* R4814, R10220, R28308, R11621, R6284, R8253

D. *P. cornutus* J5690, R2409, A233, R4769, R26117

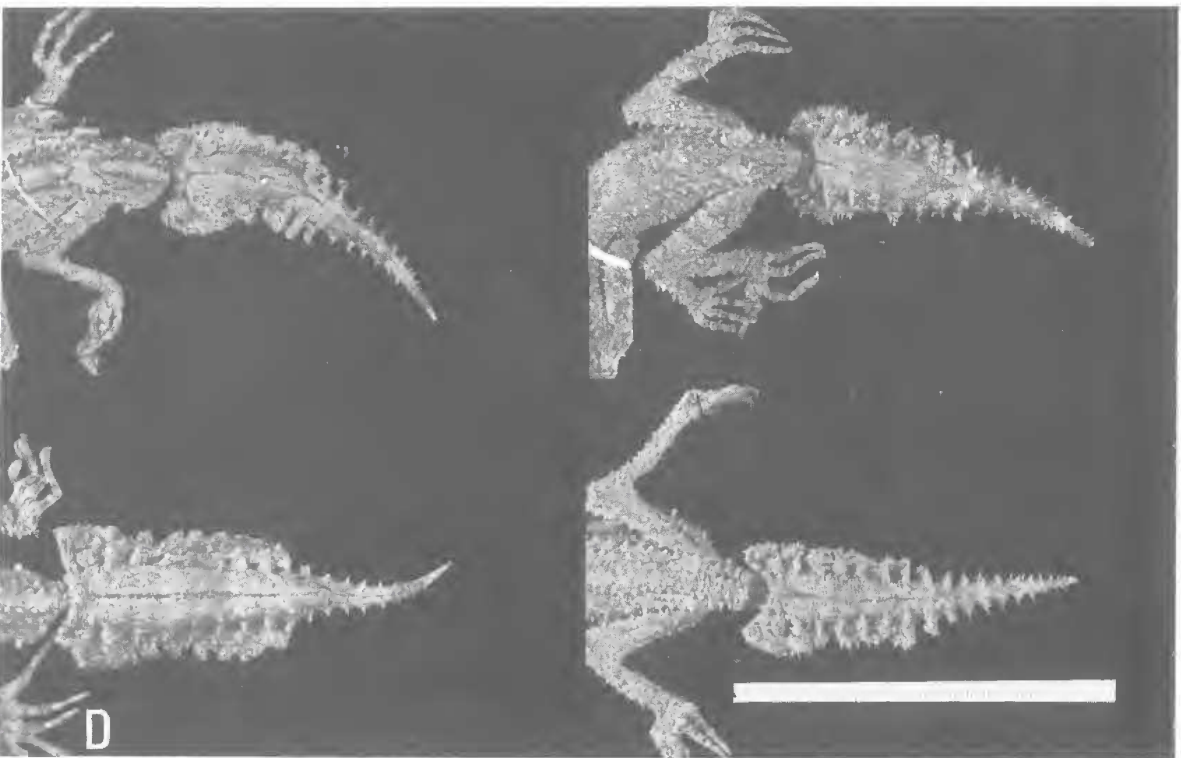
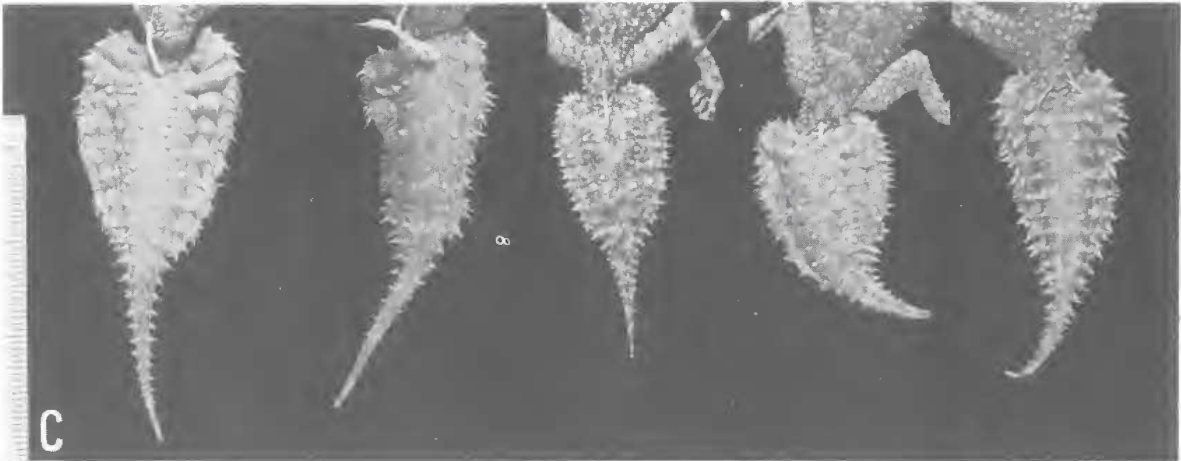
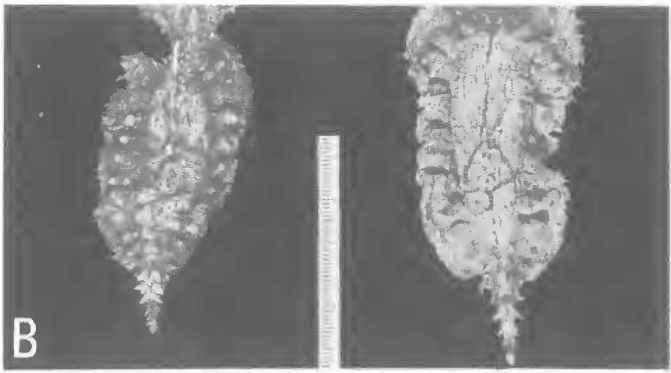
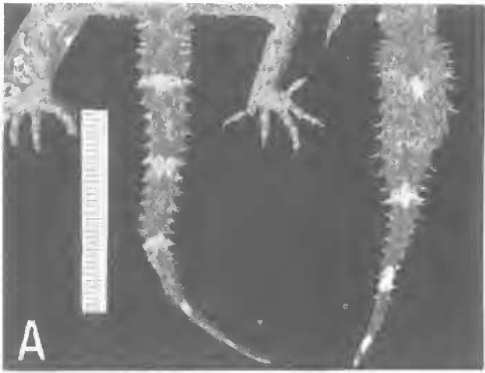


PLATE 40

Throats of *Phyllurus* spp.

- A. *Phyllurus caudiannulatus* J15619, J22286
- B. *P. salebrosus* J22288
- C. *P. cornutus* R11375
- D. *P. platurus* R4814, R28308

